CHROMOSOME NUMBERS OF SISYRINCHIUM (IRIDACEAE) IN EASTERN NORTH AMERICA[1]

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Chromosome numbers for 18 species of *Sisyrinchium* with basic complements of $x = 8$, 9, and 17, have been reported (Vilmorin and Simonet, 1927; Maude, 1940; Bowden, 1945; Covas and Schnack, 1946; Sermonti, 1948; Skottsberg, 1953; Lewis and Oliver, 1961). The 8 and 9 series contain both diploid and high polyploid species, but only diploid species are found in the secondary $x = 17$ series.

MATERIALS AND METHODS.—Immature flower buds were collected in the field and were fixed in modified Carnoy's solution (4: 3: 1). As soon as possible after fixation the buds were stored at refrigerator temperatures for periods up to 8 months; only after 7 months was deterioration noted in some cells. Buds were squashed in 1% acetic-orcein and PMCs or more occasionally somatic cells were studied. Representative chromosomes were drawn with the aid of a camera lucida at X2300. The first set of voucher specimens are filed at the Southern Methodist University herbarium (SMU). Field work for this study was supported in part by the National Science Foundation, G-9800.

For one collection seeds were soaked in water until the radicle appeared and then sown on a culture medium (Lewis and Elvin-Lewis, 1961) to facilitate more rapid growth. After pretreatment for 1-2 hours in supersaturated paradichlorobenzene, the seedlings were fixed and stained following the procedure used for the buds and mitosis was studied in root tips and apical meristems.

OBSERVATIONS.—Fifteen species and one hybrid of *Sisyrinchium* from a total of 50 populations are listed in Table 1 with their chromosome numbers and voucher data. For 11 species the collections represent a wide range of morphological variation including atypical individuals, but in each case the chromosome numbers were found to be consistent. Chromosome numbers for 9 species are reported for the first time. These include *S. minus* Engelm. & Gray, $n = 5$; *S. fibrosum* Bickn., $n = 8$; *S. campestre* Bickn., $n = 16$; *S. intermedium* Bickn., $n = 16$; *S. laxum* Otto, $n = 16$; *S. mucronatum* Michx., $n = 16$; *S. sagittiferum* Bickn., $n = 16$; *S. arizonicum* Roth., $2n = 34$-36; *S. atlanticum* Bickn., $n = 48$. Those for the remaining species, *S. albidum* Raf., *S. bermudiana* L. (as *S. angustifolium* Mill.), *S. ensigerum* Bickn., *S. langloisii* Greene, *S. mi-*

[1] EDITOR'S NOTE. It was not until after this paper went to press that I was able to reach a conclusion about the correct names of the introduced annuals. I believe that *S. laxum* of this paper is correctly *S. rosulatum* Bicknell, and *S. micranthum* is rather *S. exile* Bicknell. See "Annual Sisyrinchiums (Iridaceae) in the United States," this issue, pp. 32—42. —*L. H. Sbinners.*

cranthum Cav., and *S. pruinosum* Bickn., agree with counts by Bowden (1945) and Lewis and Oliver (1961).

The number for *S. minus* Engelm. & Gray adds a new basic number of $x = 5$ to the genus (Fig. 1, 2). Although an undetermined diploid species in the $x = 8$ series has been reported from South America (Bowden, 1945), the number of $n = 8$ for *S. fibrosum* Bickn. (Fig. 3) is the first report of a diploid North American species in this series. All other species studied, with the exception of *S. arizonicum* Roth., occur in the $x = 8$ series at either the tetraploid or the dodecaploid level. Only a tentative count of $2n = 34$ or 36 is reported for *S. arizonicum* Roth.

There is little difference in chromosome size for most species of *Sisyrinchium* (Fig. 1-9), although *S. bermudiana* L. (Fig. 11) has larger chromosomes than *S. atlanticum* Bickn. (Fig. 10) in the same basic series.

Meiotic "irregularities" were rarely observed except for the extreme bunching of chromosomes. This phenomenon was observed for most collections and consequently only a small proportion of the meiotic metaphase and anaphase plates could be accurately interpreted. Despite this, pollen were usually normal in appearance except for one collection from 1.5 miles west of the Neches River and Highway 94, Trinity Co., Texas *(Oliver, 312)*. In a sample of 100 pollen grains from each of several plants, pollen was non-staining, appeared shriveled, and micropollen were frequent. Meiosis was not observed, but the number of microspores per PMC at the tetrad stage, and frequency based on a random sample of 100 PMCs, was 4 microspores (6%), 5 microspores (26%), 6 microspores (36%), 7 microspores (12%), 8 microspores (12%), 9 microspores (4%), and 10 microspores (4%). With only 6% normal tetrad formation, meiosis was probably highly irregular. These plants are morphologically intermediate between *S. laxum* Otto and *S. micranthum* Cav., which were both growing in the immediate vicinity, and are assumed to be hybrids between these species.

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Table 1. CHROMOSOME NUMBERS OF SISYRINCHIUM IN EASTERN NORTH AMERICA.

Taxon	Gametic No.	Voucher
S. minus Engel. & Gray	5	TEXAS. Nacogdoches Co., Nacogdoches, *Oliver 317* (tepals purple), *Oliver 318* (tepals white); Brazos Co., 10.7 miles SE of College Station, *Oliver 296.**
S. fibrosum Bickn.	8	GEORGIA. Pike Co., 0.5 miles N of Pike Co.-Upson Co. line on Hwy. 19, *Oliver 327.*
S. albidum Raf.	16	LOUISIANA. Bossier Par., 5.6 miles E of Bossier City, *Oliver 272†.* TEXAS. Nacogdoches Co., Fern Lake Fire Tower, *Oliver 243†*, 0.6 miles S of Nacogdoches, *Oliver 241†.*
S. campestre Bickn.	16	ARKANSAS. Ouachita Co., 7 miles SW of Y city, *Oliver 302.* KANSAS. Wayne Co., 1.7 miles E and 1 mile S of Wayne, *Morley,* 12 May 1961; Republic Co., 1 mile E and 0.7 miles N of Belleville, *Morley,* 13 May 1961.
S. ensigerum Bickn.	16	TEXAS. Hays Co., 1 mile S of San Marcus, *Osborne 39*; Lampasas Co., 8.9 miles S of Lampasas, *Osborne 42;* Wilson Co., 10 miles S of Stockdale, *Osborne 38.*
S. intermedum Bickn.	16	TENNESSEE. Polk Co., 1 mile N of Hwys. 64 and 30 junction, *Oliver 325**.
S. langloisii Greene	16	TEXAS. Brazoria Co., 3.7 miles S of Freeport, *Lewis 5571,* 4 miles S of Freeport, *Lewis 5569B**; Chambers Co., 2.3 miles SW of Hwys. 121 and 87 junction, *Oliver 252;* Panola Co., Lake Murvaul, *Oliver 276;* San Augustine Co., 3 miles E of Attoyac River on Hwy. 21, *Oliver 248.*
S. laxum Otto	16	TEXAS. Angelina Co., 5 miles S of Lufkin, *Oliver 310;* Jasper Co., Hwys. 96 and 1004 junction, *Lewis 5626;* Nacogdoches Co., Stripling Island, *Oliver 304;* Newton Co., 4.7 miles S of Newton, *Lewis 5618.*

Figs. 1-11. Meiotic chromosomes of *Sisyrinchium* originally drawn at X2300 and reduced by ca. 28% in reproduction. Fig. 1. *S. minus*, $n = 5$, *Oliver 296*. Fig. 2. *S. minus*, $n = 5$, *Oliver 318*. Fig. 3. *S. fibrosum*, $n = 8$, *Oliver 327*. Fig. 4. *S. campestre*, $n = 16$ (one side of metaphase II), *Oliver 302*. Fig. 5. *S. campestre*, $n = 16$, *Morley*, 13 May 1961. Fig. 6. *S. pruinosum*, $n = 16$, *Lewis 5615*. Fig. 7. *S. sagittiferum*, $n = 16$, *Oliver 241*. Fig. 8. *S. sagittiferum*, $n = 16$, *Oliver 269*. Fig. 9. *S. intermedium*, $n = 16$, *Oliver 325*. Fig. 10. *S. atlanticum*, $n = 48$, *Oliver 253*. Fig. 11. *S. bermudiana*, $n = 48$, *Oliver 292*.

S. micranthum Cav.	16	TEXAS. Angelina Co., 5 miles S of Lufkin, *Oliver 309;* Hardin Co., 1.4 miles SW of Votaw, *Lewis 5630;* Trinity Co., 1 mile N of Neches River, *Oliver 311.*
S. mucronatum Michx.	16‡	CANADA. ONTARIO. Bruce Co., Oliphant, *Heimburger,* 17 June 1961.
S. pruinosum Bickn.	16	ARKANSAS. Hempstead Co., 1 mile SW of Hope, *Lewis 5615*†. TEXAS. Aransas Co., 4.2 miles SW of Aransas Pass, *Lewis 5591,* 0.2 miles S of Aransas Wildlife Refuge Headquarters, *Lewis 5597,* 1 mile W of Aransas Wildlife Refuge Headquarters, *Lewis 5592,* 1 mile NE of Rockport, *Lewis 5575*†; Ellis Co., 1 mile N of Italy, *Oliver 281;* Henderson Co., 5.3 miles W of Hwys. 175 and 31 junction, *Osborne 48;* Lampasas Co., 4 miles W of Lampasas, *Osborne 45;* Matagorda Co., 4.7 miles NE of Markham, *Lewis 5572;* San Patricio Co., 0.2 miles W of Welder Wildlife Foundation Headquarters, *Lewis 5580*†; Van Zandt Co., 3 miles SE of Wills Point, *Oliver 278*†; Wharton Co., Louise, *Lewis 5599.*
S. sagittiferum Bickn.	16	LOUISIANA. La Salle Par., 2.5 miles SE of Gene, *Oliver 269.* TEXAS. Nacogdoches Co., 10 miles S of Nacogdoches, *Oliver 237*†; Orange Co., 3.8 miles SW of Orange, *Oliver 255.*
S. laxum X *micranthum*	16‡	TEXAS. Trinity Co., 1 mile N of Neches River and Hwy. 94, *Oliver 312.*
S. arizonicum Roth.	17-18‡	MEXICO. DURANGO. 19 miles SE of Durango, *Waterfall 15541* (SMU).
S. atlanticum Bickn.	48	TEXAS. Chambers Co., 1 mile NE of Hwys. 121 and 87 junction, *Oliver 253*,* 5 miles NE of Ferry Landing, *Oliver 251*.*

* Chromosomes of 3 plants examined; otherwise the number is based on the study of 1 plant.
† Atypical collection.
‡ Chromosome number from somatic cells.

S. bermudiana L.	48	LOUISIANA. West Feliciana Par., 10 miles S of La.-Miss. state line on Hwy. 61, *Oliver 266.* TEXAS. Nacogdoches Co., Goodman's Bridge over Angelina River, *Oliver 308,* 1 mile NE of Nacogdoches, *Oliver 316,* 10 miles S of Nacogdoches, *Oliver 292.*